

# Understanding Tools, Equipment, and Infrastructure for Growing your Urban Farm



**Andy Pressman**  
**MA Urban Farming Conference**  
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SUSTAINABLE AGRICULTURE







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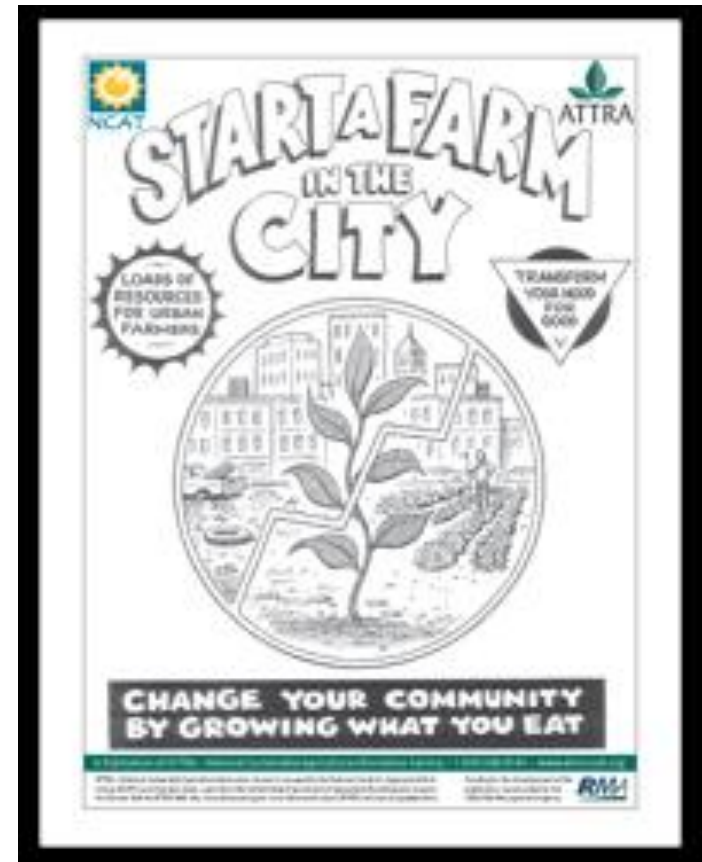


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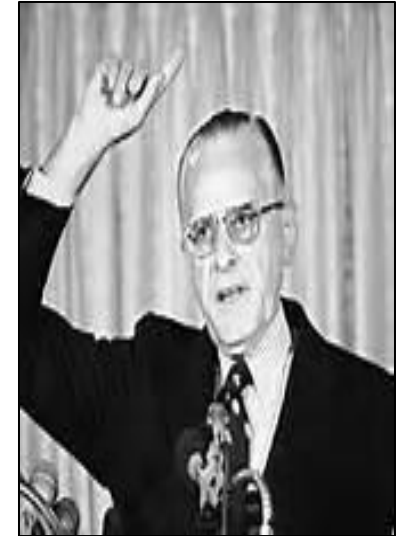
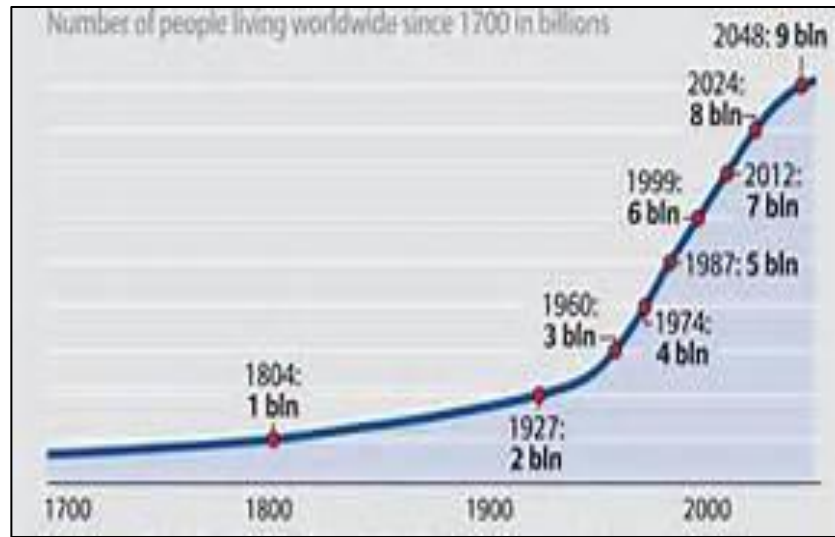
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# The Law of the Disappearing Middle



“Any intelligent fool can make things bigger, more complex... It takes a touch of genius – and a lot of courage – to move in the opposite direction.” E.F. Schumacher

# Investments



Photo: Green City Acres



Photo: The Neighborhood Farm

- Vehicle
- Rototiller
- Fencing
- Shed
- Tools (hoes, seeder, etc...)
- Irrigation
- Soil Amendments
- Post-harvesting station
- Commercial Cooler
- Marketing Supplies



# Decision - Making Process

1. Evaluate Purpose
2. Cost
3. Efficiency & Labor
4. Ergonomics
5. Sourcing Materials



# **Situation: New vegetable grower, 1 acre in the city, funds are limited! How would you prioritize your capitalization efforts?**

- A. Greenhouse (for growing transplants)
- B. Tractor/ Walk-Behind Tractor (to prepare ground and more...)
- C. Cold storage unit (to cool and hold produce)
- D. Delivery vehicle (to get produce to market)
- E. Irrigation



# Sustainable Growth

It is possible to start with a shovel, rake, and hoe....



Ultimately, a wide-range of tools & infrastructure are needed to grow.



# Optimal Equipment- Scales of Production

## 0 – 2 Acres

- Hand Tools
- Push Seeder
- Walk-Behind Rototiller

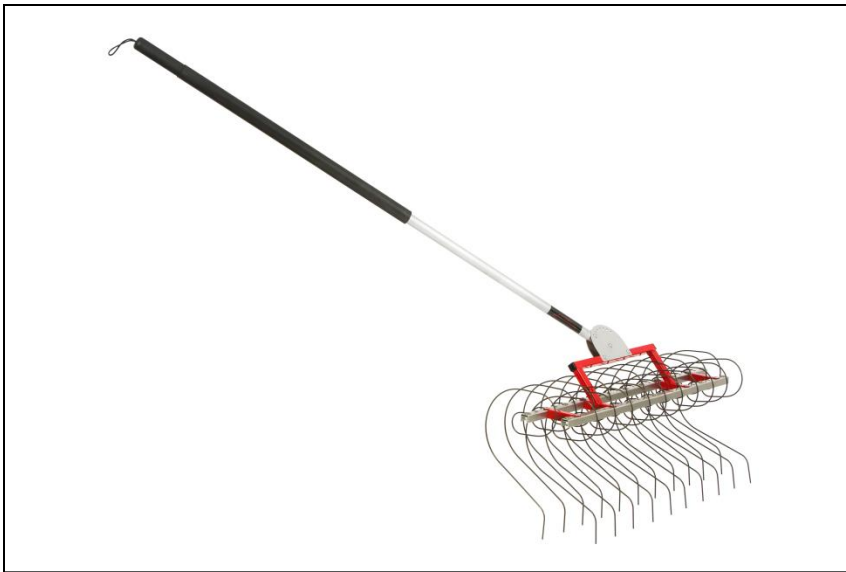


Photo: Two Bad Cats, LLC

## 3 – 10 + Acres

- 35 – 50 HP 4WD Tractor with Loader
- 3PTH Chisels
- Disks 4' – 8' wide
- 3PTH Rototiller
- 3PTH Cultivators
- Better Push or 3PTH Seeder
- Manure Spreader
- Fertilizer Spreader

# Finding the Right Scale

- Set goals & quality of life;
- Keep records and use them to make informed decisions;
- Design production systems for now & the future;
- Don't be afraid to invest in your farm and make changes;
- Talk with Others.



Photo: Newton Community Farm

“The challenge is to find a size that represents a good ‘fit’ for a grower’s management skills.”

- John Hendrickson



# Expenses

**Income – Expense = Profit vs. Income – Profit = Expenses (HMI)**

Identify expenses and determine which one's you can cut:

- Inescapable
- Wealth Generating
- Maintenance

(Farmer is paid out of expenses, not profit).

**Don't Forget to Add a Contingency Line Item to Your Budget!**

# Considerations for Capitalization

- Does the investment fit within the context of my whole farm plan?
- Is the investment scale appropriate; both in terms of current and future needs?
- What does it cost to own and operate?
- Is it easy to find parts, maintain and repair?
- Is it safe and are you comfortable using it?
- Do you need it? Are you truly investing in a weak link?

# Resource Inventory & Planning

Categories Help You Plan More Accurately and Systematically

Item	Cost High	Cost Low	New or Used	Cost to Rent or Hire	Notes	Priority
Tractor						
Tillage						
Cultivation						
Post Harvest						
Delivery						



# True Costs of Owning Equipment

- Capital Investment
- Operating(maintenance, fuel, repairs, lubricants)
- Storage and related building taxes
- Depreciation
- Insurance
- Skills and Knowledge
- Responsibility
- Satisfaction



# Do You Need to Own It?

- Purchasing new or used;
- Rental (by job or time period);
- Custom hire;
- Lease (with option to buy);
- Joint ownership;
- Trade / Barter.

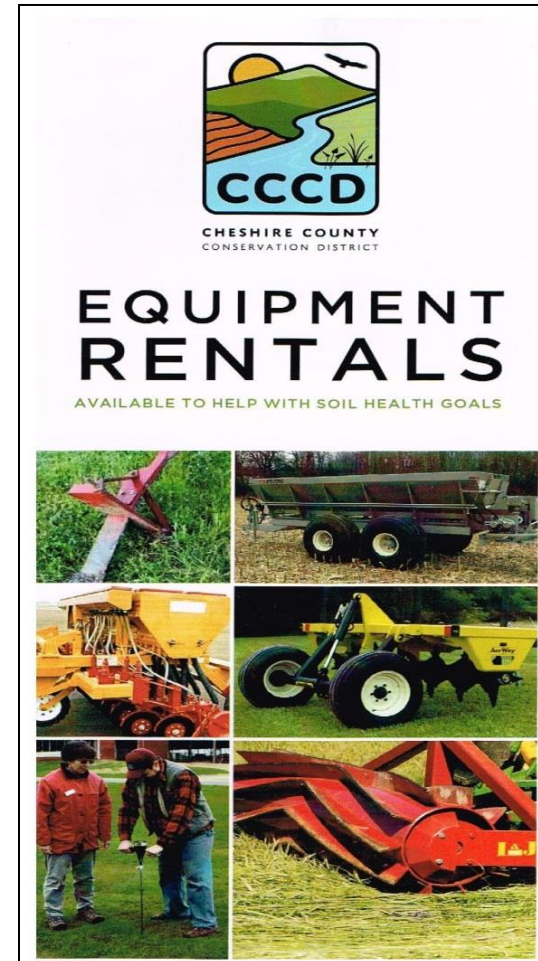


Image: Cheshire County Conservation District (NH).



# Tools For Small-Scale Crop Production

3 Components:

1. Fit the hand 

2. Fit the body 

3. Fit the need 





?????

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# Broadforks





# Direct Seeding



Photo: Stonewall Farm





# Weed Management

- Weed Crop or Soil?
- Steel in the field.
- Timing of cultivation.
- Depth of cultivation.



# Backpack Sprayers



- Piston, diaphragm, mechanized (electric, battery, gas).



Photos: Johnny's Selected Seeds



Photo: Andy Pressman



# Mechanization

- Mechanization is often linked to expansion (acreage, herd size, markets, enterprises);
- Mechanization purchases can have significant impacts on a business's financial picture;
- Mechanization is closely linked to labor;
- Many farms have limited capitalization funds and many are adverse to debt and risk.



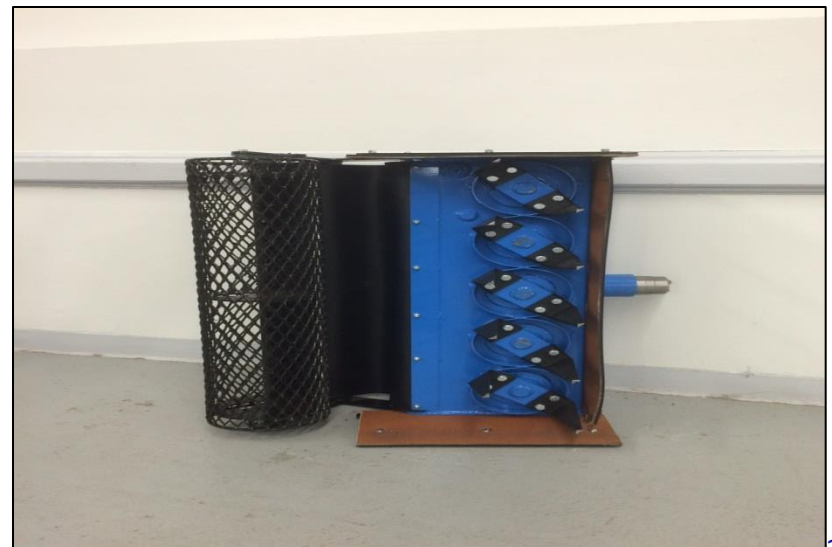


# Tractors: What Do They Do?

- **Pull:** they provide traction for pulling via the draw bar.
- **Lift:** they provide lifting capacity via hydraulic power to the three point hitch and the front end loader.
- **Power:** they provide power transfer via the Power Take Off (PTO).



# Walk-Behind Tractors





# Tractor Considerations

- What is the need?
- Are there specific HP requirements, including implements?
- What is the farmer's skill level for operating tractors?
- What is the farmer's skill level for maintaining tractors?
- Will there be multiple users?
- What is the budget?
- How readily available are parts?



Source: Shane LaBrake



# Tools for Small-Scale Farming

- Tools for Small-Scale Crop Production Webinar
- [www.attra.ncat.org](http://www.attra.ncat.org)

## Suppliers

- Earth Tools:  
[www.earthtoolsbcs.com](http://www.earthtoolsbcs.com)
- Johnny's Selected Seeds:  
[www.johnnysseeds.com](http://www.johnnysseeds.com)
- Rogue Hoe:  
[www.roguehoe.com](http://www.roguehoe.com)
- Green Heron Tools LLC:  
[www.greenherontools.com](http://www.greenherontools.com)
- Red Pig Garden Tools:  
[www.redpigtools.com](http://www.redpigtools.com)



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## Equipment and Tools for Small-Scale Intensive Crop Production

By Andy Pressman,  
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IF417

This publication focuses on equipment and tools for intensive crop production on a small-scale commercial farm. It details equipment and hand tools for soil preparation, planting, and weed management. The use of appropriate equipment and tools, both in terms of size and practicality, can increase production efficiency and profits while minimizing the disturbance to soil and to plant health. A list of further resources and tool and equipment suppliers is included.

### Introduction/Overview

The use of appropriate agricultural equipment and tools for small-scale intensive crop production contributes to the viability of the farm by enhancing production efficiency. Equipment and tools are necessary for plant propagation, soil preparation, planting, pest and weed control, irrigation, harvesting, postharvest handling, storage, and distribution. Sustainable agriculture can be a labor-intensive business and by selecting the appropriate tool for the task at hand, farmers can increase profits by increasing crop yields, improving crop quality, and reducing expenses. Factors to consider when choosing appropriate agricultural equipment and tools include the location and growing conditions of the farm, the type of crops being grown, the production practices being used, and how the crops will be marketed.

In the past, the volume of business—or size of the farm—was the most important factor in yielding a profit (Kains, 1973). Many small-scale farmers today are generating high profits from land bases that are five acres or less. Practical farmers at this scale are able to sustainably manage their production and their farm finances, which are the result of reasonable capital costs and low annual operating expenses. Farms intensively producing on five acres or less rely on the versatility of their manual labor but also may utilize mechanized equipment to maximize production efficiency.

Tools and equipment should relate to the scale of production, and compromises are necessary as farming systems transition from a hand-labor



*The author's farm's 140 with belly-mounted implements. Photo: Andy Pressman, NCAT*

scale to a tractor scale. Limiting the number of different row spacings, limiting the number of different bed widths, and designing beds that consider slope, soil erosion, and tractor-wheel widths are important considerations when scaling up production to include a tractor and implements. It is also important to consider how best to match the right equipment to the cropping system, including such factors such as how the soil and plants are managed and how the use of cover crops and crop rotations is incorporated. Diversified cropping systems can complicate matters because various crops require different row spacing, which means the implements may need to be adjusted for each crop.

Equipment for small-scale intensive crop production tends to be simple and less specialized than equipment for larger-scale production. As a result, the equipment is often affordable and requires less capital. The economics of owning and maintaining farm machinery may appear

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# Infrastructure

- High Tunnels
- Irrigation
- Fencing
- Washing & Packing Facilities
- Slaughter Facilities
- Processing Facilities (meats & poultry, grains, value-added, etc...)
- Storage
- Distribution
- Logistical Services



Photo: City Roots Urban Farm



# Commercial Refrigeration

- 1). Helps even out workflow.
- 2). Locks in the value of the produce.



Photo: Andy Pressman



Photos: SPIN-Farming®



# Irrigation

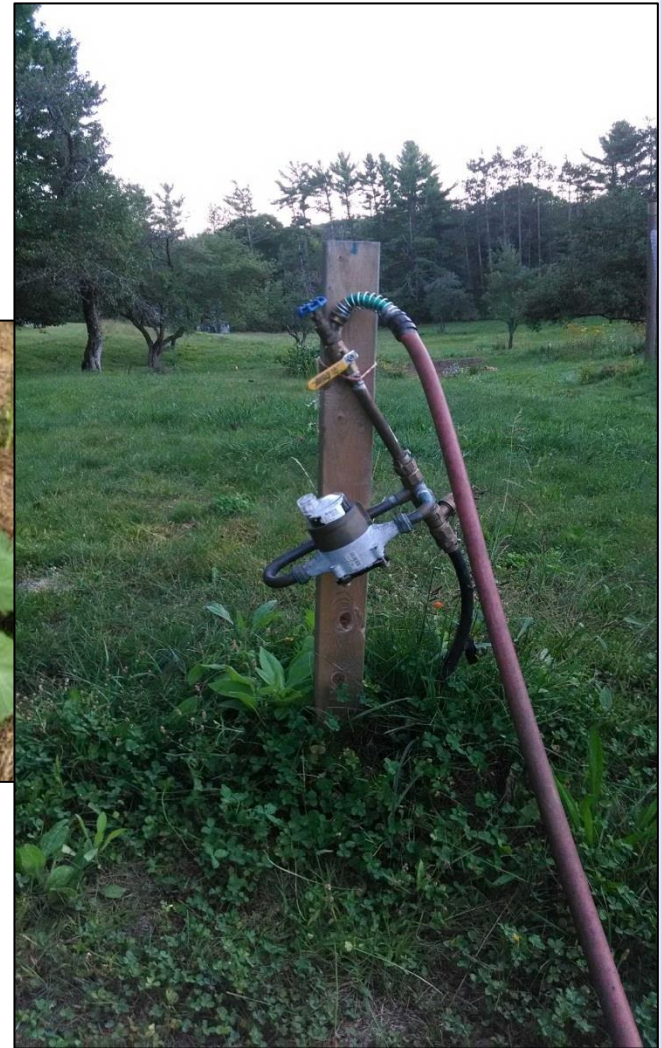


Photo: Spin-Farming©



# Extending the Growing Season

- Important component of diversified farms
- Season extension = better markets
- Can manipulate heat, water, humidity, temperature to optimize plant growth
- Low cost
- Increased yields



# Natural Resource Conservation Service (NRCS)

- Provides financial assistance to plan and implement conservation practices that improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland;
- Environmental Quality Incentives Program (EQIP);
- EQIP Organic Initiative.





# MDAR MEGA Program

- Matching Enterprise Grants for Agriculture Program (MEGA) seeks to assist new and beginning farm businesses (1-5 years) with start up or expansion costs.
- Provides matching funds (up to \$10,000) for equipment, infrastructure or other capital improvements needed to implement strategies recommended through the planning process.

# Understanding Tools, Equipment, & Infrastructure for the Urban Farm

- Prepare to invest in equipment & infrastructure
- Use goals, business plans, and records to make informed decisions
- Understand scales of production
- Weigh all options before investing
- Allow for change



Thanks!

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